NICARAGUA

ARAP

Agriculture Reconstruction Assistance Program

P R O J E C T F I N A L R E P O R T

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Submitted by:
Chemonics International Inc.

To:
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Topics

I. Exotic Fruits – Tropical and Subtropical

1. Recognizing the fruits

2. Local and internacional importante

3. Brief presentation of some crops

    Mangosteen, Rambutan, Lychee, Longan

    Darían, Atemoya, Carambola, Mango, others

4. Some agricultural practices with trees

    Material and propagation methods
    Planting system-distance and orientation

II. Strawberries, Blackberries and Raspberries

1. Local and intenational importance
2. Brief handling presentation

Background/Objectives

As part of the recovery from the devastation caused by Hurricane Mitch, the ARAP NICARAGUA Project was established with financial assistance from USAID. It is looking for crops options that can help not only in the reconstruction process and economic growth of the affected regions but also intended to be environmentally sustainable. The following tasks were assigned to this consultant:

1. Evaluate the soils, elevations, rainfall, temperature, infrastructure and other agro-climatic factors that affect the possibility of producing brambleberries and strawberries in selected areas of Nicaragua.

2. Investigate the state of USAID introduced tropical and subtropical fruit cultivars in the early '90s, evaluate the potential of the surviving cultivars for commercial production, and investigate the possibilities of replacement of the lost cultivars, possibly from the neighboring countries and elsewhere for further trials.

3. Provide a plan of action for ARAP intervention regarding specific cultivars under consideration.

4. Provide direction and oversight for a collateral assignment to evaluate the domestic, US and European markets for fresh and processed brambleberries and tropical fruits.

5. Provide a written report and a seminar to review the findings and recommendations, and carry out a dialogue with interested growers and agribusiness entrepreneurs.

Program of activities carried out

Visits to the farms, institutions, facilities and meetings with interested parties and seminar, as programmed and suggested by ARAP were carried out in two trips. The first was from June 5-11 to monitor the early introductions and the second was from June 19 to July 12, to complete the assignment in Nicaragua. It included stopovers in Homestead, Florida to contact nurseries and Guatemala for an update on the brambleberry technologies for the tropical highlands and sourcing of planting materials for ARAP.

Details on the activities, including observations, comments and recommendations on the individual visits and meetings are included in the daily activities report submitted weekly previously and listed in this report as Appendix I, II, III and IV.

Report on the compliance to the task assignments.

A. Task # 2 - The status of EXITOS introduced cultivars

Anticipating the booming demand for the tropical and subtropical exotic fruits not only in the world market but also in the Central American domestic market, PROEXAG/EXITOS initiated a program of introducing the Central Americans to the appreciation, production, utilization and marketing of these fruits. Consequently, initial introductions of cultivars of lychee, longan, atemoya, rambutan, carambola and durian were made to the cooperating Central American countries. Channeled through APENN, Nicaragua received in 1993, a total of 179 grafts and air layers from nurseries in Hawaii and Queensland, Australia., There were 40 Atemoyas represented by 3 cultivars, 40 carambolas of 4 cultivars, 20 Kohala longans, and 79 lychees of 4 cultivars. Because the government nurseries at that time were not in good shape, APENN decided to use private nurseries to take care of the plants initially before distribution for multiplication and trial plantings. A monitoring report by EXITOS a few months later indicated some 31% losses in the nursery. After distribution for trial plantings, another monitoring report in 1994 showed 48 plants actually still alive in the field and some 52 that were not accessible and not monitored at all. The monitoring I have conducted so far this year, following leads on where they were planted, yielded the following plants in the field:

6 Atemoyas: cultivar ID lost, 3 in fairly good condition for multiplication, 3 doubtful.

22 Carambolas: cultivar ID lost, 21 in fairly good condition for multiplication, one to be moved to the lowland.

2 Longans: both okay, not much branching for multiplication.

Lychees: no survivors found, so far.

Even though the surviving plants have lost their identity for the moment, they are good cultivars and every effort should be made to provide them the best growing conditions for multiplication. Identification may be made later. Seedling stocks should be produced from the native plants Anona and Averrhoa to serve as rootstocks for the scion taken from these introduced survivors. The technicians from Campos Azules could do these, the new grafts to be cared for at the nursery of Campos Azules which is now in fairly good condition. The two longans should be allowed to grow and produce before airlayering is done on them.

B. Task # 2 - On the replacement and acquisition of other tropical/subtropical fruit species and cultivars

Because the reasons for introducing these cultivars are much stronger now than before,

efforts should be made to replace the lost materials and at the same time bring in the others such as the recommended rambutan and durian cultivars that Nicaragua did not receive. Replacements of the same cultivars could probably be available (in small quantities) from the other countries that also received the same planting materials. A report was prepared on the sourcing of these plant materials, from local sources, Central American countries, Florida nurseries, Hawaii nurseries and Queensland nurseries for lychee, longan, rambutan, atemoya, carambola and durian. These documents are included in this report and listed as Appendix V, Va, Vb, Vc. Vd, Ve.

Efforts should be made to source some of these materials from the neighboring countries. An ARAP Horticulturist could probably make the rounds of these sources to establish personal contact and make arrangements for getting some of these planting materials. Introductions from Florida, Hawaii and elsewhere should be made as soon as possible.

We lost a lot of the previous introductions because the nurseries that received them were not well equipped to handle them and the field trial plantings were not well cared for by the nursery/farm owners. We expect to do a lot better this time, now that the government facilities are very much better (Campos Azules) and that ARAP has entered into a working agreement with PAC/World Relief in the introduction, handling, multiplication and trial plantings of these introduced material. By the time the materials come in, World Relief would have in place the facilities needed to handle them properly as follows:

A mist room where the new introductions, after they are potted immediately and properly, will stay for a few days or weeks until they start producing the first flush. They are then moved to the nursery bed.

Nursery beds provided with partial shade and irrigation is where the new introductions will stay for a few months until the first and/or second flush (the leaves) have matured. Then they may be planted in the field, in a multiplication nursery or demonstration plot.

Multiplication plots should provide all the necessary conditions for good growth. These plants will be air layered or their branches used as sources of budsticks for grafting. When there are enough planting materials, then they may be distributed for trial and demonstration plantings.

We may have to send some of these plants to Campos Azules to supply other Mitch designated areas outside of PCA/World Relief jurisdiction, sort of hedging our bets. Campos Azules would also have the necessary propagating beds, nursery beds with partial shade and irrigation where they will grow until ready for field planting in the multiplication nursery or

demonstration plots. PAC/World Relief and Campos Azules are supposed to have extension services to

promote and provide technical assistance in the production as well as post harvest handling and marketing of the fruit products.

C. Tasks # 2 & 3 - On the possibility of producing commercially tropical and subtropical fruits in Nicaragua, ARAP action plan

Based on ARAP's market studies (with collaboration from APENN), top priorities for commercialization have been assigned to rambutan, lychee and mangosteen. In the second category would be longan, mango varieties Manila (Oro) and Ataulfo, durian, atemoya and carambola. Mangosteen can be sourced as seeds or seedlings from El Recreo, FHIA/Lancetilla and Juan Mata's farm in Piedra Parada, Guatemala. NICA Fruit has sufficient seedling stocks, ready for grafting, with budsticks of Manila and Ataulfo cultivars. These budsticks may be available from either Mexico or Peru.

Lychee and bngan are tropical highland crops (over 1,000 meters elevation), cool but not freezing, although there are cultivars that will produce in the lowlands but with fruits of poorer quality. Rambutan and mangosteen are typically grown in the well drained soils of the humid tropics, below 800 meters elevation. Carambola, durian and atemoya (grafted to Anona squamosa rootstock) require tropical and not too wet conditions for normal growth. Atemoya grafted to Anona cherimola rootstock would do well in the tropical highlands. Mango cultivars are for the dry lowlands, the longer the dry season (but with irrigation) the more ideal for flower induction to widen the market window.

As mentioned above, ARAP had developed linkages with World Relief/PAC (Pueblos en Accion Comunitaria) to achieve continuity in ARAP's brambleberry, tropical and subtropical fruits development projects. Cultivar introductions, multiplications, trial and commercial plantings can be achieved through this channel of linkages, With PAC/WR(Auxilio Mundial) Centro de Recursos located in both Highland and Lowland areas presenting a variety of soil and climatic conditions, these diverse fruit tree germplasm could find adaptability within this wide range of farm diversity. Through these same linkages, markets, domestic to start with, then regional and finally the international market, can be developed.

The consultant visited various regions of Nicaragua, which included the eastern tropical humid areas of El Recreo and Nueva Guinea, the western tropical dry areas of Carazo and Jinotepe, the central highlands of Matagalpa and Jinotega, and the Northern highlands and lowlands of Madriz and Nueva Segovia. Based principally on the climatic conditions in the areas visited and the kind of climate the crops require, Table 1 is presented as a guide for the trial plantings of the plant materials that are being introduced. It also indicates, more or less, some of the possible commercial production areas of the tropical and subtropical fruit crops.

For the lesser known tropical and subtropical exotic fruits, a promotion/orientation program might be necessary for the farmers to go into production of these crops and the consumers to create a market for them. Tourism as in Hawaii and gourmet centers can help develop the domestic market.

D. Task # 1) - On possibility of producing brambleberries and strawberries commercially

In 1987, PROEXAG/USAID Project embarked on a successful non-traditional export crop project involving the brambleberries and strawberries for Central America. Nicaragua and El Salvador were out of this project's area of influence at that time. Presently, Guatemala and Costa Rica are exporting these products, mainly to Europe and to a much lesser degree to the U.S. because of the "Cyclospora Scare" on Central American berries. Honduras is starting a similar project and Nicaragua is apparently interested as well.

The brambleberries and strawberries are highland crops, needing cool temperatures for their normal development. Experiences in Guatemala and Costa Rica have indicated that below 5,000 feet elevation, it becomes more difficult to produce berries of export quality because of increased problems with pest and diseases. For Nicaragua, production of the berries for export face a few more formidable obstacles as follows:

- Large enough fairly level areas at or above 5,000 elevation with good soils and irrigation facilities are not abundant in Nicaragua, especially for red raspberries production.

- Good areas would largely be some 200 kilometers or more from air transport and with the long haul through poor bumpy roads, these delicate fruits will suffer.

- For export products like berries, they have to be picked by hand very carefully, packed in containers and field heat removed in the production site as soon as possible.

Blackberries and strawberries are presently being produced in Nicaragua. Producers have access to planting materials and I have included in my reports, other sources of the recommended cultivar for the tropical highlands which are as follows:

For blackberries: Brazos
For red raspberries: Summit
For strawberries: Sweet Charlie, Chandler

There is a good local market for strawberries and with the increased tourism industry in Nicaragua, demand should rise as well. For increased production of quality fruits, I would recommend a training program on production and post harvest handling of these products from experienced producers in the tropical highlands. Markets should be studied as well as processing for added value on the products.

Table 1 also shows the areas where the brambleberries and strawberries may do well and grown commercially, principally for the domestic market.

E. Task # 4 - On providing direction and oversight to marketing

For the consultant doing the market studies on these crops, he would probably be needing production information on these crops such as the months of availability of the fruits during the year and average yields per unit area. Table 2 is presented for that purpose. Since many of these crops are new and have no production records in Nicaragua, we can only give calculated guesses, based on other producing areas with similar climatic conditions. As perennial crops, yield data will vary according to many factors, especially the age of the plants or plantation. Including early and late producing varieties can widen market windows just as artificial flower induction and pruning, both of which can change availability dates of the products. Storage technologies can also help widen windows in some crops.

I will be available, within my capacity, to supply any other production information that may be needed for the market studies.

F. Task # 5) - On providing a written final report, presentation of a seminar and dialogues on the tasks performed

Dialogues with the contacts were carried out during the performance of the tasks, including discussions with ARAP authorities after performance of the tasks.

The seminar on the tropical and subtropical fruits, brambleberries and strawberry was presented at Alameda Hotel in Esteli on July 11 to a group of about 65 participants composed of farmers, bankers, technicians and project administrators linked to the interest in these crops. A copy of the handout given to the paarticipants is included here as Appendix 6. It included a list of the topics covered, delivered as a color slide presentation. The large number of questions entertained during and after the presentation indicated quite a bit of interest on the part of the participants.

This is the final written report, completed, printed and submitted to ARAP Nicaragua authorities.

Other observations, comments and recommendations

Most of the Nicaraguans have been kept unaware of the pleasures to the palate, nutritional value and economic benefits that can be derived from these exotic tropical and subtropical fruits and brambleberries. I recommend full support not only to the introductions of these plant materials but also a strong promotional effort to introduce these fruits to the general public as soon possible. Local technicians and entrepreneurs should be equipped with first hand knowledge on how these crops are grown and their products utilized. Within limits of budget limitations, I would recommend that ARAP's technicians and collaborating entrepreneurs visit the closest centers of commercial production of these crops, in the neighboring countries, Florida, Hawaii, Australia and even the Far East.

As I indicated somewhere in the text, I recommend channeling ARAP's introduction efforts not only through one NGO network but should also include another or the public sector such as the Ministry of Agriculture to guarantee access to these materials by the general public.

Appendices

1. Daily Activities Report of Jose R. Mondoñedo
   ARAP Nicaragua Project June 5-11, 2000

2. Daily Activities Report of Jose R. Mondoñedo
   ARAP Nicaragua Project June 19-25, 2000

3. Daily Activities Report of Jose R. Mondoñedo
   ARAP Nicaragua Project June 26-July 1, 2000

4. Daily Activities Report of Jose R. Mondoñedo
   ARAP Nicaragua Project July 3-12, 2000

5. Fruit & Spice Park Sources of Planting Materials

5a. Lychee Sources of Planting Materials for ARAP Nicaragua

5b. Longan Sources of Planting Materials for ARAP Nicaragua

5c. Rambutan Sources of Plant Materials for ARAP Nicaragua

5d. Durian, Atemoya and Carambola Sources of Planting
Materials for ARAP Nicaragua

5e. Berry Sources of Planting Materials

6. Temarios del Seminario

Acknowledgements

The consultant would like to thank ARAP Nicaragua and Chemonics for the opportunity to participate in this interesting project. His thanks extend personally to the administrators, technicians and support personnel of the project for making this an enjoyable learning assignment for him instead of just a job.

Table 1. Some recommended areas for trial plantings of the tropical and subtropical fruit cultivars, brambleberries and strawberries.

Crop cultivars	Some recommended areas for trial plantings
Lychee, all cultivars	Sabanah, Plan de Grama, Jinotega
Lychee - Brewster	Ocotal, Palacaguina, Matagalpa
Longan all cultivars	Sabanah, Plan de Grama, Jinotega
Rambutan, all cultivars	S Jose de Bocay, El Recreo, Nueva Guinea
Rambutan bajo riego	Palacaguina, Quilali, Wiwili
Mangosteen	S Jose de Bocay, El Recreo, Nueva Guinea
Mangosteen bajo riego	Palacaguina, Quilali, Wiwili
Durian	S Jose de Bocay, El Recreo, Nueva Guinea
Atemoya/A squamosa y Atemoya/Atemoya	Wiwili, Quilali, Nueva Guinea, Palacaguina - con riego
Atemoya/A.cherimola	Sabanah, Plan de Grama, Jinotega
Carambola, all cultivars	Wiwili, Quilali, Nueva Guinea, Palacaguina - con riego
Mango - Manila/Oro	Palacaguina, areas con largo periodo de sequia - riego recomendado
Moras - Brazos	Sabanah, Plan de Grama, Jinotega riego recomendado en todo

Frambuesa Sabanah, Plan de Grama, Jinotega riego recomendado en todo

Fresa Sabanah, Plan de Grama, Jinotega riego recomendado en todo

Table 2. Tropical fruits market presence and yields. *

Fruit Crop	Market presence	Plants/ha	Estimated yield
Lychee	June-July	156	30 kgm/tree 4 - 5 tons/ha
Longan	July-August	156	25 kgm/tree 3.5 - 4.5 tons/ha
Rambutan	July-September	178	45 km/tree 7 - 10 tons/ha
Mangosteen	June-August	70	100 kgm/tree 5 - 10 tons/ha
Durian	May-August	100	70 kgm/tree 5 - 10 tons/ha
Atemoya	June-September	277	30 kgm/tree 5 - 10 tons/ha
Carambola	Almost all year	204	70 kgm/tree 12 - 18 tons/ha
Mango	February-June	100	100 kgm/tree 8 12 tons/ha
Mora	All year	2,000	2,000 flats/ha 5,450 kgm/ha
Frambuesa	All year	2,677	1,000 flats/ha 2,700 kgm/ha
Fresa	All year	50,000	8 tons/ha
		100,000	12 tons/ha

* Data are calculated guesses - no reliable data source available.
Adult plants at normal planting distances.

Appendix 1. DAILY ACTIVITIES REPORT OF JOSE R. MONDOÑEDO ARAP NICARAGUA PROJECT JUNE 5-11, 2000

June 5 Activities

I left the house in Annapolis, MD at 4:30 am for BWI Airport.
After a 2.5 hour delay due some mechanical problems, the American Airlines plane left BWI 9:40 am for Miami and I missed my original connection. I finally arrived in Managua at 6:00 pm on the next flight and registered at Princess Hotel. I was contacted in the evening by James Johnson, ARAP Field Supervisor and Laura Vinoly, Project Manager of ARAP about the next day's program.

June 6 Activities

Objectives/Purpose:

To visit the "El Recreo" Agricultural Experiment Station of INTA (Instituto Nicaraguense Tecnologico Agropecuario) for the humid tropics and look into possible cooperative activities with El Recreo towards the realization of ARAP's objectives.

Contacts:

Guillermo Bendaña, Agronomist Promoter of ARAP.
David Bradford, Agroforestry Promoter, ARAP.
Manuel Davila Villegas, Agronomist of El Recreo.
Susanna Mudge, Senior VP/LAC Chemonics.
Laura Vinoly, ARAP Project Manager.
Ramiro Irabien, ARAP Chief of Party.
Ricardo Frohmader, Chemonic's Guatemala Office.
James Johnson, Field Supervisor.

Activities:

Guillermo picked me up at the hotel at 6:15 am and we drove to the end of the road at Rama, some 300 kilometers East of Managua, towards the Atlantic Coast where Kukra Hill is located. Kukra Hill can be reached from Rama by a 2 hour boat ride down Rio Escondido. We waited a bit for David Bradford but we were informed that he may not arrive until 2 or 3 pm so we drove to El Recreo, located at about Km 280. We met with Manuel Davila, agronomist of El
Recreo who gave us a brief tour of the place and some additional information on the station.

I had visited this station in 1992 and it kind of looked abandoned then, without much financial

support from the government. It had not improved much and was actually reduced in area, from 1,100 hectares then to about 500 hectares at present due to a takeover by the military for land distribution. The station or center is at about 15-30 meters above sea level, with an average annual rainfall precipitation of about 3,200 to 3,500 mm and a fairly short dry season of about 2 to 3 months. It definitely has a warm humid tropical climate and its clay loam soil makes it suitable for the live collection of tropical plants that it has, including such crops as african oil palm, hybrid coconut, pejibaye (heart of palm), cacao, spices (vanilla, nutmeg, canela, black pepper), para rubber, forest trees (such as Acacia mangium) and tropical fruits -bananas, plantains, mangosteen and other exotics. Five agricultural technicians attend to the maintenance of this center, including an extension of this center at Kukra Hill in the Atlantic coast. The maintenance of the center is presently dependent principally on funds generated by the preparation and sale of plants such as seedlings of coconut hybrids, mangosteen, raw rubber tapped from the trees and other seedling plants.

There is a large mangosteen tree (30-40 years old at least) and 9 others about 15 years old, all in production at this time so that a few fruit sample were gathered for tasting by ARAP personnel at the project office in Managua. They have not tasted them before. In the nurseries are some one year old seedlings of mangosteen (exhibiting some sunburn) and about 1,000 seeds of mangosteen in the process of germination. There are seedlings of pejibaye and forest trees, root cuttings of black pepper and others. The agronomist was advised on the critical need of shade for mangosteen seedlings up to about 4-5 years of age (in the field as well), and to avoid injury to the tap root at any time, which is critical to the length of the juvenile stage.

We met later with David Bradford at Rama who informed us about some rambutan plantings in Kukra Hill (from Costa Rica?), a short row of about 10 to 12 plants, probably 9 or 10 years old, already in their third year of production. There are a few other tropical fruits, possibly White Sapote, based on his description. The mangosteen plants introduced there some 40- 50 years ago are scattered in residences in the area and fruits are being sold at about "5 reales" each (about 50 cents to the Cordoba).

We returned to Managua, arriving at the ARAP Office at about 8:00 pm. Met with James Johnson, Ramiro Irabien, Susan Mudge, Laura Vinoly and Ricardo Frohmader. Discussed with James the next day's activities.

Observations:

El Recreo would be one of the sources of mangosteen and other planting materials that ARAP might need in its development projects.

With some assistance, it could be the center for introduction and multiplication of new crop cultivars for the humid tropics, such as rambutan and durian.

El Recreo is quite a bit far from Managua and several kilometers at the road's end are in poor condition. To get to the station, one has to cross Mico River in a dugout. The Station, however, has a power boat for transport to Kukra Hill.

Without assistance, care of ARAP's plant materials at El Recreo could be a problem.

June 7 Activities

Objectives/Purpose:

To visit Finca Hammonia (Selva Negra Cabins) in Matagalpa to monitor the status of exotic fruits trees and brambleberries provided by EXITOS and nursery/greenhouse activities in the farm.

To meet with Julio Solorzano (representing the coffee farmers) and discuss their interest on producing brambleberries, exotic fruits and flowers.

To look at the status of the blackberry and strawberry farm of Yvonne Castellon, the problems and possible remedies.

To meet with the Women's Coop on their interest in producing potted flowering and ornamental plants for the local market.

Contacts:

Guillermo Bendaña, Agronomist Promoter, ARAP.
Miguel Angel Rodriguez, Irrigation Promoter, ARAP.
Gregorio "Goyito" Cruz Ramos, Asst. Field Supervisor), Irma and Maria (daughters of Chema, Field Supervisor, who worked with me in the establishment of the exotic fruits in this farm).
Julio Solorzano, Coffee farmer of Matagalpa.
Amanda Torres and about 15 ladies of Cooperativa de Mujeres de Flores de Jinotega.
Mr. Laurenz Leverenz, Deputy Chief of Party, ARAP.

Activities, observations, recommendations:

Guillermo Bendaña picked me up at the hotel at 8:00 am and we drove to Sebaco to pick up Miguel Angel. Drove to Selva Negra (about 1,200 meters above sea level) at Km 136 on the road to Jinotega. The 700 manzana farm and resort is the only green forested area around this mountainous region. Goyito led us to the remaining three trees of exotic fruits introduced in 1992. Two trees appear to be longans (rounded leaflet tips and do not have the low branching characteristics) instead of lychee. Further verification should be done on these trees since no longans were introduced here on record. More sunlight should be provided these plant by eliminating branches of trees shading

the plants. The third tree is Kari, a Carambola (Star Fruit) cultivar that has not grown much in 8

years and has been flowering but has never set fruit. These conditions are the cold climate effects on the carambola which need warmer climate for normal development. Grafts should be made from this tree and planted at lower elevations so that they can set fruits. A building is presently being constructed where the blackberries were planted. Apparently, no new plantings of blackberry were made.

The farm is into cut flower production, with about 3 manzanas in greenhouse structures containing chrysanthemums, lilies, roses, african daisies and baby's breath. There are beetle problems on some of the lily varieties, control on which were recommended. There are serious powdery mildew and red mite problems on the roses. Miguel Angel gave pesticide recommendations. There are nutritional problems on the african daisies, exhibiting a variety of deficiency symptoms. A fertilization program was recommended. All these flowers are for local consumption. They will not pass export quality requirements. Roses are sold at 40 cordobas per dozen, mums at 10 cordobas per bunch of 6 stems.

Met with Julio Solorzano at Selva Negra. He lost some 27 manzanas of coffee plantation (adjacent to Selva negra) due to landslides caused by hurricane Mitch. Without market demand, he is just maintaining his blackberry plantings with no plans for expansion. He is now interested in growing roses, looking into the feasibility of such a project for the local market for now. He is undecided on the type of greenhouse to construct. Remembering what Paul Daum (PROEXAG/EXITOS flower consultant) had always reiterated before - that he does not recommend growing roses for export in the Central American Highlands at less than 5,000 feet elevation, I mentioned that information to Julio. Pests and diseases become more acute at lower elevations and flower buttons do not grow as big. He was advised to consult with specialists such as Paul Daum before investing on the high costs of greenhouse construction. He would like to know what other crops can be grown for export and the domestic market. We went through with this exercise in September of 1996 when I was IESC (International Executive Service Corp) consulant to ASOCAFEMAT, the Asociacion de Cafeteros de Matagalpa, looking for alternative crops to coffee.

Visited the farm of Yvonne Castellon (about 1400 meter above sea level) at Km 151 on the road to Jinotega. Sra. Castellon was not there and we just looked around. Miguel Angel had seen this farm before and talked to Yvonne several months back. I also had met Yvonne in 1996. According to Miguel Angel, this farm was established a little more than a year ago with new planting materials of Chandler cultivar from California, with black plastic mulch and drip irrigation. Some good harvest at the beginning were taken and she may have recovered some of the initial investments. The strawberry plantation presently looks abandoned. There are a lot of missing hills, most plant crowns with dead leaves, mummified fruits, small irregular shape (cat-faced, due to insect damage, irregular pollination, disease, etc.) of the few ripening fruits visible, the black plastic mulch torn in many places, globs of fertilizers applied beside the plants (instead of through the irrigation system), drip system not turned on because it rained and the plants were not pruned since they were planted. The more recently established sections look a little better than the older section. According to

Miguel Angel, only a pail of decent looking fruits is harvested per day fom the whole area. Plant materials are most likely already contaminated with virus.

The blackberry plantation has been abandoned for some time. Reason given was lack of market for the

berries. Plantation could be rehabilitated by removing all above soil surface plant materials and burning them. A good fumigation of the soil surface, fertilization and irrigation and appropriate management of new emerging primocanes should follow.

Drove on towards Jinotega to meet with members of Cooperative de Flores de los Mujeres de Jinotega (at Km 159) of about 21 members. They claim to have already done market/demand studies (?) and are already establishing a rudimentary nursery shed across the road, bags being filled already with soil for planting flowers and ornamentals to be sold as potted plants. They are just thinking now of plants such as "Milflores" (Hydrangea), planting "seeds?" of carnation, bromeliads, roses (miniatures?), ferns and orchids as their plant materials. This group needs basic orientation on feasibility and market demand studies, nursery establishment and management, information on implications of propagator beds with mist spray, etc.

Returned to Managua arriving at the project office at about 7:00 pm. Consulted with James Johnson on the next day's activities. Met Mr. Lance Leverenz and talked briefly with Laura Vinoly.

June 8 Activities

Purpose/Objectives:

To meet with the INTA Director in Esteli about possible cooperative projects with ARAP.

To meet with the Directiva of Union Cooperativa Agropecuaria de Miraflor on possible cooperative projects with ARAP.

Contacts:

Guillermo Bendaña, Agronomist Promoter of ARAP.
Miguel Angel Rodriguez, Irrigation Promoter of ARAP.
Ramon Sandoval, INTA Director in Esteli.
Pedro Pineda, Field Agronomist of INTA

Porfirio Zepeda, Manager of Union Cooperativa Agropecuaria de Miraflor (UCA) in Esteli.

Activities, observations, recommendations:

Guillermo Bendaña picked me up at the hotel at &:00 am and drove to Esteli (at Km 146) to pick up Miguel Angel Rodriguez. Esteli is at 850 meters above sea level, 800 mm of rainfall as yearly average. Drove to the office of INTA at Esteli and met with Ramon Sandoval. Their principal activity is in tissue culture and production of potato planting materials for the region. In one of the discussions on potato sizes and types, I mentioned about my experience in the Bolivian Highlands

where I saw many types, sizes and colors of andean potatoes. With the interest on baby products (corn, carrots tomatoes, etc) for gourmet salads, flight menu for example, they might look at the feasibility of introduction, production and export of baby potatoes of all colors. They should look into baby carrots as well. Pedro Pineda gave us a brief tour of the facilities in this place and took us to Centro Experimental Miraflores Para Papa in La Perla at 1,200 meters elevation, with an average yearly precipitation of about 1,300 mm. He also gave us a brief account of activities in this center - from tissue culture of virus free materials obtained as cuttings from Centro de Investigacion de Papa (CIP) to the production of pre-basic seed materials, basic (foundation) seed, registered seed and certified seed planting materials for sale to farmers. Samples are obtained at each stage for virus tests. The visit to these facilities was very interesting and informative but is outside of this consultant's terms of reference.

Drove to the office of Union Cooperativa Agropecuaria de Miraflor (UCA) and met with Porfirio Zepeda, UCA-Miraflor Manager with three of the cooperative's board members. Porfirio was already briefed previously on ARAP's objectives, especially on the tropical exotic fruits. We discussed the crops that could be grown considering the edaphic and climatic conditions of the region. Porfirio mentioned two specific sites in Miraflor, both with good fertile loam soils and an annual average precipitation of about 1,300 mm:

Lower region at 1,000 to 1,200 meters elevation with relatively dry months from December to April.

Upper region at 1,200 to 1,500 meters elevation with relatively shorter dry period.

Crops mentioned that Porfirio wanted to try in both areas included the following:

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Drove back to Managua and returned to the hotel at about 8:00 pm.

June 9 Activities

Purpose/Objectives:

To monitor the tropical exotic fruit introductions of EXITOS Project at Vivero Alejandria, located at Km 36.5 on the road to Carazo.

To visit Centro Experimental Campos Azules of the Ministry of Agriculture at Masatepe and

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Nicolas Bolaños, Proprietor of Vivero Alejandria and

Carlos Bolaños, son of Nicolas.
Lydia Fuentes, Field Supervisor, Vivero Alejandria.
Guillermo Castillo, Director, Centro Experimental Campos Azules del Ministerio Agricultura y Ganaderia en Masatepe. Tel. 088-62268.
Rigoberto Mungia, the Director's Assistant.
James Johnson and Lance Leverenz, ARAP
Ricardo Frohmader, Chemonics, Guatemala.

Activities, observations, recommendations:

Guillermo Bendaña picked me up at the hotel at 8:00 am and drove to Vivero Alejandria in Jinotepe. The owner and son were not there so that Lydia Fuentes, the Field Supervisor, showed us where the exotic plant introductions are located. The Vivero is at 430 meters above sea level. There are 3 atemoyas in the nursery that have been producing sweet fruits the last few years. They would have yielded more and with much bigger fruits if they were planted in the open field instead of the crowded nursery. There are immature fruits at present but are under attack by borers. They were advised to consult a pathologist for the control of the borers. There are two other atemoya plants of the same group but have not fruited. It appears that the graft scions were lost and these two are just the stocks that have grown. They were advised to topwork these two stocks with atemoya scion from the fruiting plants. They were also advised to prepare seedlings of atemoya, sugarapple or cherimola seeds to serve as stock for the atemoya scions. There are 18 tall carambola trees that have been giving many sweet fruits the last six years. They would have given much more with bigger fruits if they were out in the open. These plant materials are good sources of genetic materials for

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center's grafting specialists to help out Vivero Alejandria with the propagation of the atemoyas and carambolas. We asked Guillermo to prepare seedlings of annonaceas to serve as stocks for scions from Vivero Alejandria.

There is a lot of road construction (widening) going on along the road where Viveros Paraiso is supposed to be located. We could not find it with all that construction. ARAP's agronomist will try again next week. When I visited this farm in 1994, some exotic

fruit trees, the 3 carambolas especially were laden with fairly big and very sweet fruits. Native carambolas are very sour. Since I saw them the last time, James Johnson reported that they were lost to a brush fire.

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Ricardo Frohmader, Chemonics Guatemala Office
Kevin Sanderson, Country Director, World Relief Nicaragua
Chester Lee Brinser III, Program Assistant, World Relief

Activities:

Representatives of Auxilio Mundial (World Relief) through Ricardo Frohmader requested a breakfast meeting with them. At breakfast, they wanted to get acquainted with ARAP's project on the brambleberries and the tropical exotic fruits. They are also interested in these crops for the small

farmers they are working with. Their focus is to help the farmers help themselves by growing some of these crops, with emphasis on organic farming. They have been doing some introductions themselves, mostly of seed materials. They apparently have ties with ECHO organization that is based in Florida. After some discussions, I had to excuse myself as I had a plane to catch at noon. I may meet with them again when I return.

Upon arrival at the airport, I find that American Airlines cancelled my flight. They were full on their Sunday flights so they booked me on the Continental flight for Sunday. I checked in at Best Western (Hotel Marcedes) across from the airport. Spent the afteroon on the report.

June 11 Activities

Flew out of Managua at about 8:00 am for Houston and then to Baltimore. Arrived in Annapolis at about 6:00 pm

General observations and recommendations

ARAP Project of USAID had requested my services in evaluating the status of the tropical exotic fruits. I monitored these introductions in February of 1994. The results of my monitoring this time are detailed below:

Atemoya: 40 grafts of 3 cultivars introduced in '92 18 survived the nursery care - late '92
7 confirmed survivors, 9 not monitored - '94
3 good grafts, growing nicely - 2000
2 stocks only, scion lost - '2000
(a farm still to be monitored)

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0 confirmed survivors, 15 not monitored in '94
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Lychee: 79 marcots of 4 cultivars introduced '92
57 marcots survived the nursery - late '92.
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Of the few survivors confirmed, their cultivar identification were lost or unavailable, one reason for the need of new introductions of these crops. Recommendations on the surviving materials are detailed in the daily trip activities.

A better initial handling of the introduced materials to survive the shock of transport and new environment is needed. Government facilities such as the much improved propagation and nursery facilities of Centro Experimental Campos Azules should be considered. Control of materials is lost with private nurseries.

ARAP also requested a technical evaluation of the potential for producing brambleberries and tropical exotic fruits commercially in Nicaragua. The effort on this was started with the initial visits to some farms, details of which are included in the daily activities report. For the highland conditions, I

would recommend perusing my final report on a consultancy effort I did

with IESC/ASOCAFEMAT in 1996 entitled "Diversification of Coffee Farms in the Matagalpa/Jinotega Region of Nicaragua". Most of my observations and recommendations in that report are still valid. On crops for the warm humid region and the warm dry regions, my efforts would focus on these during my second consultancy visit scheduled for June 19 to July 8, 2000.

Table 3. RECOMMENDED CULTIVARS FOR TRIAL PLANTINGS
ARAP Nicaragua

Lychee: Brewster, Mauritius, Kaimana
Others: Hak Yip, Groff, Kwai Mi, Wai Chi

Longan: Kohala, Biew Kiew, Sri Chompoo
Others: Dagelman, Tiger Eye, IFAS-3

Rambutan: R-134, R-162, R-167, Jitlee, Benji, Rong Rien

Durian: Monthong, Chanee, Gob Yeow

Atemoya: Geffner, African Pride, Pinks Mammoth

Carambola: Arkin, Kyra, Kari, Fuang Tung, Sri Kembangan

Blackberry: Brazos

Red Raspberry: Summit

Strawberry: Chandler, Sweet Charlie, Camarosa

Notes on trial plantings of tropicals:

Recommended that trial plots should contain 9 to 12 trees of the same cultivar, planted in square at recommended planting distances.
(Copies of production manuals were made on the tropicals, subtropicals and berries and were left on file at ARAP)

Recommended records to keep:

Dates on planting, flowering, fruiting, harvest
Growth characteristics, pruning system
Pests and diseases
Fruiting - size, shape, color, sweetness (brix), yields
Other observations

Recommended weather conditions to take:

Rainfall data

Maximum and minimum temperatures
Wind direction and velocity (need for windbreaks)
Sunny and cloudy days

Appendix 1. DAILY ACTIVITIES REPORT OF JOSE R. MONDOÑEDO ARAP NICARAGUA PROJECT JUNE 5-11, 2000

June 5 Activities

I left the house in Annapolis, MD at 4:30 am for BWI Airport.
After a 2.5 hour delay due some mechanical problems, the American Airlines plane left BWI 9:40 am for Miami and I missed my original connection. I finally arrived in Managua at 6:00 pm on the next flight and registered at Princess Hotel. I was contacted in the evening by James Johnson, ARAP Field Supervisor and Laura Vinoly, Project Manager of ARAP about the next day's program.

June 6 Activities

Objectives/Purpose:

To visit the "El Recreo" Agricultural Experiment Station of INTA (Instituto Nicaraguense Tecnologico Agropecuario) for the humid tropics and look into possible cooperative activities with El Recreo towards the realization of ARAP's objectives.

Contacts:

Guillermo Bendaña, Agronomist Promoter of ARAP.
David Bradford, Agroforestry Promoter, ARAP.
Manuel Davila Villegas, Agronomist of El Recreo.
Susanna Mudge, Senior VP/LAC Chemonics.
Laura Vinoly, ARAP Project Manager.
Ramiro Irabien, ARAP Chief of Party.
Ricardo Frohmader, Chemonic's Guatemala Office.
James Johnson, Field Supervisor.

Activities:

Guillermo picked me up at the hotel at 6:15 am and we drove to the end of the road at Rama, some 300 kilometers East of Managua, towards the Atlantic Coast where Kukra Hill is located. Kukra Hill can be reached from Rama by a 2 hour boat ride down Rio Escondido. We waited a bit for David Bradford but we were informed that he may not arrive until 2 or 3 pm so we drove to El Recreo, located at about Km 280. We met with Manuel Davila, agronomist of El Recreo who gave us a brief tour of the place and some additional information on the station.

I had visited this station in 1992 and it kind of looked abandoned then, without much financial support from the government. It had not improved much and was actually reduced in area, from 1,100 hectares then to about 500 hectares at present due to a takeover by the military for land distribution. The station or center is at about 15-30 meters above sea level, with an average annual rainfall precipitation of about 3,200 to 3,500 mm and a fairly short dry season of about 2 to 3 months. It definitely has a warm humid tropical climate and its clay loam soil makes it suitable for the live collection of tropical plants that it has, including such crops as african oil palm, hybrid coconut, pejibaye (heart of palm), cacao, spices (vanilla, nutmeg, canela, black pepper), para rubber, forest trees (such as Acacia mangium) and tropical fruits - bananas, plantains, mangosteen and other exotics. Five agricultural technicians attend to the maintenance of this center, including an extension of this center at Kukra Hill in the Atlantic coast. The maintenance of the center is presently dependent principally on funds generated by the preparation and sale of plants such as seedlings of coconut hybrids, mangosteen, raw rubber tapped from the trees and other seedling plants.

There is a large mangosteen tree (30-40 years old at least) and 9 others about 15 years old, all in production at this time so that a few fruit sample were gathered for tasting by ARAP personnel at the project office in Managua. They have not tasted them before. In the nurseries are some one year old seedlings of mangosteen (exhibiting some sunburn) and about 1,000 seeds of mangosteen in the process of germination. There are seedlings of pejibaye and forest trees, root cuttings of black pepper and others. The agronomist was advised on the critical need of shade for mangosteen seedlings up to about 4-5 years of age (in the field as well), and to avoid injury to the tap root at any time, which is critical to the length of the juvenile stage.

We met later with David Bradford at Rama who informed us about some rambutan plantings in Kukra Hill (from Costa Rica?), a short row of about 10 to 12 plants, probably 9 or 10 years old, already in their third year of production. There are a few other tropical fruits, possibly White Sapote, based on his description. The mangosteen plants introduced there some 40- 50 years ago are scattered in residences in the area and fruits are being sold at about "5 reales" each (about 50 cents to the Cordoba).

We returned to Managua, arriving at the ARAP Office at about 8:00 pm. Met with James Johnson, Ramiro Irabien, Susan Mudge, Laura Vinoly and Ricardo Frohmader. Discussed with James the next day's activities.

Observations:

El Recreo would be one of the sources of mangosteen and other planting materials that ARAP might need in its development projects.

With some assistance, it could be the center for introduction and multiplication of new crop cultivars for the humid tropics, such as rambutan and durian.

El Recreo is quite a bit far from Managua and several kilometers at the road's end are in poor condition. To get to the station, one has to cross Mico River in a dugout. The Station, however, has a power boat for transport to Kukra Hill.

Without assistance, care of ARAP's plant materials at El Recreo could be a problem.

June 7 Activities

Objectives/Purpose:

To visit Finca Hammonia (Selva Negra Cabins) in Matagalpa to monitor the status of exotic fruits trees and brambleberries provided by EXITOS and nursery/greenhouse activities in the farm.

To meet with Julio Solorzano (representing the coffee farmers) and discuss their interest on

producing brambleberries, exotic fruits and flowers.

To look at the status of the blackberry and strawberry farm of Yvonne Castellon, the problems and possible remedies.

To meet with the Women's Coop on their interest in producing potted flowering and ornamental plants for the local market.

Contacts:

Guillermo Bendaña, Agronomist Promoter, ARAP.
Miguel Angel Rodriguez, Irrigation Promoter, ARAP.
Gregorio "Goyito" Cruz Ramos, Asst. Field Supervisor), Irma and Maria (daughters of Chema, Field Supervisor, who worked with me in the establishment of the exotic fruits in this farm).
Julio Solorzano, Coffee farmer of Matagalpa.
Amanda Torres and about 15 ladies of Cooperativa de Mujeres de Flores de Jinotega.
Mr. Laurenz Leverenz, Deputy Chief of Party, ARAP.

Activities, observations, recommendations:

Guillermo Bendaña picked me up at the hotel at 8:00 am and we drove to Sebaco to pick up Miguel Angel. Drove to Selva Negra (about 1,200 meters above sea level) at Km 136 on the road to Jinotega.

The 700 manzana farm and resort is the only green forested area around this mountainous region. Goyito led us to the remaining three trees of exotic fruits introduced in 1992. Two trees appear to be longans (rounded leaflet tips and do not have the low branching characteristics) instead of lychee. Further verification should be done on these trees since no longans were introduced here on record.
More sunlight should be provided these plant by eliminating branches of trees shading the plants. The third tree is Kari, a Carambola (Star Fruit) cultivar that has not grown much in 8 years and has been flowering but has never set fruit. These conditions are the cold climate effects on the carambola which need warmer climate for normal development. Grafts should be made from this tree and planted at lower elevations so that they can set fruits. A building is presently being constructed where the blackberries were planted. Apparently, no new plantings of blackberry were made.

The farm is into cut flower production, with about 3 manzanas in greenhouse structures containing chrysanthemums, lilies, roses, african daisies and baby's breath. There are beetle problems on some of the lily varieties, control on which were recommended. There are serious powdery mildew and red mite problems on the roses. Miguel Angel gave pesticide recommendations. There are nutritional problems on the african daisies, exhibiting a variety of deficiency symptoms. A fertilization program was recommended. All these flowers are for local consumption. They will not pass export quality requirements. Roses are sold at 40 cordobas per dozen, mums at 10 cordobas per bunch of 6 stems.

Met with Julio Solorzano at Selva Negra. He lost some 27 manzanas of coffee plantation (adjacent to Selva negra) due to landslides caused by hurricane Mitch. Without market demand, he is just maintaining his blackberry plantings with no plans for expansion. He is now interested in growing roses, looking into the feasibility of such a project for the local market for now. He is undecided on the type of greenhouse to construct. Remembering what Paul Daum (PROEXAG/EXITOS flower consultant) had always reiterated before - that he does not recommend growing roses for export in the Central American Highlands at less than 5,000 feet elevation, I mentioned that information to Julio. Pests and diseases become more acute at lower elevations and flower buttons do not grow as big. He was advised to consult with specialists such as Paul Daum before investing on the high costs of greenhouse construction. He would like to know what other crops can be grown for export and the domestic market. We went through with this exercise in September of 1996 when I was IESC (International Executive Service Corp) consulant to ASOCAFEMAT, the Asociacion de Cafeteros de Matagalpa, looking for alternative crops to coffee.

Visited the farm of Yvonne Castellon (about 1400 meter above sea level) at Km 151 on the road to Jinotega. Sra. Castellon was not there and we just looked around. Miguel Angel had seen this farm before and talked to Yvonne several months back. I also had met Yvonne in 1996. According to Miguel Angel, this farm was established a little more than a year ago with new planting materials of Chandler cultivar from California, with black plastic mulch and drip irrigation. Some good harvest

at the beginning were taken and she may have recovered some of the initial investments. The strawberry plantation presently looks abandoned. There are a lot of missing hills, most plant crowns with dead leaves, mummified fruits, small irregular shape (cat-faced, due to insect damage, irregular pollination, disease, etc.) of the few ripening fruits visible, the black plastic mulch torn in many places, globs of fertilizers applied beside the plants (instead of through the irrigation system), drip system not turned on because it rained and the plants were not pruned since they were planted. The more recently established sections look a little better than the older section. According to Miguel Angel, only a pail of

decent looking fruits is harvested per day from the whole area. Plant materials are most likely already contaminated with virus.

The blackberry plantation has been abandoned for some time. Reason given was lack of market for the berries. Plantation could be rehabilitated by removing all above soil surface plant materials and burning them. A good fumigation of the soil surface, fertilization and irrigation and appropriate management of new emerging primocanes should follow.

Drove on towards Jinotega to meet with members of Cooperative de Flores de los Mujeres de Jinotega (at Km 159) of about 21 members. They claim to have already done market/demand studies (?) and are already establishing a rudimentary nursery shed across the road, bags being filled already with soil for planting flowers and ornamentals to be sold as potted plants. They are just thinking now of plants such as "Milflores" (Hydrangea), planting "seeds?" of carnation, bromeliads, roses (miniatures?), ferns and orchids as their plant materials. This group needs basic orientation on

feasibility and market demand studies, nursery establishment and management, information on implications of propagator beds with mist spray, etc.

Returned to Managua arriving at the project office at about 7:00 pm. Consulted with James Johnson on the next day's activities. Met Mr. Lance Leverenz and talked briefly with Laura Vinoly.

June 8 Activities

Purpose/Objectives:

To meet with the INTA Director in Esteli about possible cooperative projects with ARAP.

To meet with the Directiva of Union Cooperativa Agropecuaria de Miraflor on possible cooperative projects with ARAP.

Contacts:

Guillermo Bendaña, Agronomist Promoter of ARAP.
Miguel Angel Rodriguez, Irrigation Promoter of ARAP.
Ramon Sandoval, INTA Director in Esteli.
Pedro Pineda, Field Agronomist of INTA

Porfirio Zepeda, Manager of Union Cooperativa Agropecuaria de Miraflor (UCA) in Esteli.

Activities, observations, recommendations:

Guillermo Bendaña picked me up at the hotel at &:00 am and drove to Esteli (at Km 146) to pick up Miguel Angel Rodriguez. Esteli is at 850 meters above sea level, 800 mm of rainfall as yearly average. Drove to the office of INTA at Esteli and met with Ramon Sandoval. Their principal activity is in tissue culture and production of potato planting materials for the region. In one of the discussions on potato sizes and types, I mentioned about my experience in the Bolivian Highlands where I saw many types, sizes and colors of andean potatoes. With the interest on baby products (corn, carrots tomatoes, etc) for gourmet salads, flight menu for example, they might look at the feasibility of introduction, production and export of baby potatoes of all colors. They should look into baby carrots as well. Pedro Pineda gave us a brief tour of the facilities in this place and took us to Centro Experimental Miraflores Para Papa in La Perla at 1,200 meters elevation, with an average yearly precipitation of about 1,300 mm. He also gave us a brief account of activities in this center - from tissue culture of virus free materials obtained as cuttings from Centro de Investigacion de Papa (CIP) to the production of pre-basic seed materials, basic (foundation) seed, registered seed

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A better initial handling of the introduced materials to survive the shock of transport and new environment is needed. Government facilities such as the much improved propagation and nursery facilities of Centro Experimental Campos Azules should be considered. Control of materials is lost

with private nurseries.

ARAP also requested a technical evaluation of the potential for producing brambleberries and tropical exotic fruits commercially in Nicaragua. The effort on this was started with the initial visits to some farms, details of which are included in the daily activities report. For the highland conditions, I would recommend perusing my final report on a consultancy effort I did with IESC/ASOCAFEMAT in 1996 entitled "Diversification of Coffee Farms in the Matagalpa/Jinotega Region of Nicaragua". Most of my observations and recommendations in that report are still valid. On crops for the warm humid region and the warm dry regions, my efforts would focus on these during my second consultancy visit scheduled for June 19 to July 8, 2000.

Appendix 2. DAILY ACTIVITIES REPORT OF JOSE R. MONDOÑEDO ARAP NICARAGUA PROJECT JUNE 19-26, 2000

Monday, June 19 activities

Objectives/Purpose:

Travel to Miami to scout for possible sources of planting materials of exotic tropical fruits - lychee, longan, atemoya and carambola.

Contacts:

Fruits and Spice Park, Homestead, Florida.
24801 SW 187 Ave, Homestead, FL 33031
Tel: 305 247-5727

Paradise Palm Tree Inc., Robert Zinzell, Proprietor.
19051 SW 147 Ave., Miami, FL
Tel: 305 252-8733 Fax: 305 235-6833

Green-Land Tropical Nursery, Roberto Perez, Proprietor
18795 S.W. 216 St., Miami, FL

Contacted several other nurseries by phone and on site but did not have the fruit trees we were looking for.

Activities/observations:

Left the apartment for BWI Airport at 5:00 am. Flew to Miami, arrived at 9:30 am, got a car at Budget Car Rental and settled at a friend's house in South Miami.

With a list of nurseries obtained previously from Fruits and Spice Park and the Telephone Book Yellow Pages, started calling nurseries that might have the tropical fruits needed. Some were just fax numbers and/or leave a message, some had just one or two of the four kinds of fruit trees I was looking for. Selected some nurseries in Homestead to visit in the afternoon.

Fruits and Spice Park is a botanical garden of tropical fruits and spices. Obtained their updated list of "Sources of Tropical and Subtropical Fruit Plants" which included not only of Dade County but also the rest of Florida, the other states including Hawaii and Puerto Rico and outside the US, including Australia, Jamaica and Malaysia.

Paradise Palm Tree Inc. has longans (Kohala) which are now in fruit, about two months from ripening and harvest. The lychees (Brewster and Mauritius) presently appear to be in the last weeks of fruiting. Lychee airlayers already in 7 gallon pots (6-8 feet tall, some with fruit) sell for $35 each. Kohala longan in 7 gal. containers at $30 each. They are exported to the Caribbean Islands as is, transported in large container vans. He has no atemoyas or carambolas now but could prepare grafts given sufficient lead time, which would be about a year and a half since he has to prepare the stock from seed. Their price would be about $10-15 each. Air layers of lychees and longans would be about $10-12 each. They would take about three months to prepare.

Green-Land Nursery has also lychees (Mauritius only) and longans (Kohala) and could prepare airlayers at $10-12 each, given sufficient lead time of 3 months. They have no atemoyas. Carambolas would take a year and a half to prepare. They could prepare the airlayers for shipment (boxed) but will not take the responsibility of shipping. Preparation of grafts and air layers for shipment would depend on Nicaragua's phytosanitary rules and regulations for entry of plant materials into the country.

Returned to the residence at about 5:00 pm.

Comments:

There was an interesting comment I got from one of the nursery people about some nurseries in Florida that are not so happy selling plant materials to other countries as they become threats or competition to Florida products in the US market. Mexican and Guatemalan mangoes are cited as examples.

Homestead nurseries visited did not seem to have much of a selection on available cultivars of lychee

and longan. They do not have much experience in shipping to Central American countries.

Paradise Palm could be a source of some of the tropical fruit plants for ARAP.

Tuesday, June 20 activities

Objectives/purpose:

To look further into other nurseries in Homestead that may serve as source of planting materials for ARAP.

Contacts:

Hill Brothers Nursery
Homestead, FL Tel: 305 246-0770

D Ramirez Nursery
12350 Krome Ave.
Miami, FL Tel: 305 255-0287

Grapeyard Nursery
16701 sw 177 Ave.
Miami, FL 33187 Tel: 305 252-8524

Hagstedts Tropicals Nursery
15454 SW 260 St.
Miami FL. Tel 305 246-3376

Colleen Boggs & Walt Lyford
Pine Island Nursery Inc.
16300 SW 184 St.
Miami, FL. Tel: 305 233-5501
Fax: 305 233-5610 Email: glowalt@earthlink.net

Possum Trot Tropical Fruit Nursery
14955 SW 216 St.
Miami, FL. Tel: 305 235-1768

Activities/observations:

At about 8:00 am contacted more nurseries by phone with the updated list of nurseries from Fruits

and Spice Park. Some just had fax tones for response and others to leave a message. Listed down some promising leads for site visit.

D. Martinez Nursery had some lychee and longan but do not know how to handle materials for shipping and not interested in exporting plant materials.

Possum Trot Nursery looked run down and had a for sale sign on it.

Hill Brothers Nursery look abandoned. Did not bother to enter them.

Jutta Hagstedts expressed some reluctance to ship plant materials to foreign countries, citing future competition. She asked me to come back later me to talk to Paul Hagstedts. She did recommend that I deal with Pine Island Nursery.

Pine Island Nursery is big business, as evidenced by big vans waiting to load potted plants of a variety of ornamentals and fruit trees. There are acres of shaded bed and nurseries with mist spray and overhead sprinklers. The nursery exports many kinds of ornamentals and fruit trees including the subtropical exotics. I was provided a list of available fruit plants, including cultivars in each category. They mentioned other cultivars of longans, lychees, atemoyas and carambolas that are not in the available list, although some of these we have introduced previously through PROEXAG/EXITOS. Colleen (the owner) and Walt (the Manager) said they could supply what we need. Prices mentioned for airlayers and grafts at $8-10 depending on cultivars. Additional cultivars are:

Lychee: Hak Yip, Emperor
Longan: Sri Chompoo, Diamond River (flowers twice a year)
Atemoya: Geffner, African Pride, Bradley, Priestly, Pink Mammoth
Carambola: Kari, Sri Kembangan

They have to look into the shipping costs and would need the Nicaraguan phytosanitary regulations for entry of plant materials.
Returned to the residence at about 5:30 pm.

Comments:

Pine Island Nursery, so far, seem to be a very good source for supplying most of our subtropical exotic fruit plant materials.

Incidentally, Colleen Boggs mentioned having worked with PROEXAG Ecuador before.

Wednesday, June 21 activities

Objectives/purpose:

To contact on site other nurseries in Homestead, especially those that responded with taped recording.

Contacts:

Flinn Nursery

CHEMONICS INTERNATIONAL, INC
23201 SW 197 Ave.
Homestead, FL 33031 Tel.: 305 247-8466

Pablo & Julian Lara

Lara Farms Nursery
18660 SW 200 St.
Miami - Redlands, FL 33187 Tel: 305 253-2750

Don & Katie Chafin
Going Bananas Tropical Nursery
24401 SW 197 Ave.
Homestead, FL. Tel: 305 247-0397
Fax; 305 247-7877 Email: goingbananas@bellsouth.net

Activities/observations:

Took off for Homestead at 8:30 am and Looked for Flinn Nursery. The place where it is supposed to be has a longan plantation and a privately enclosed compound. Nobody around.

Pablo Lara worked previously at the Florida Experimental Station. He has Mauritius and Brewster lychee, on which he could prepare airlyers he priced at $7-10 each. He also has Kohala and Ponyai longan, airlayers at $7-10 each. He has carambola (Arkin, Kwang Tung and Kary). Arkin carambola graft in a 7 gal can at $18. He could also prepare rooted cuttings of carambola but would be rather delicate to handle for shipment. He says that Kwang Tung, although very sweet, has extended segments that easily bruise during shipment. He does not have atemoya. He has a lot of Sapote and a few other exotics. He can prepare the air layers of lychee and longan with sphagnum moss, inspected ($39 fee), packed as needed but will not take care of shipping responsibilities.

The Chafins of Going Bananas have a fairly large operation of bananas, lychees and longans and deal only on orders but they are oriented towards helping third world countries. The lychees just finished production (Mauritius from May 15-June 7th, Brewster from June 1-21). Kohala longan fruiting season from late July to mid August. A lychee and longan list of cultivars available was provided. Airlayers priced at $15 each (probably negotiable in quantity) for regular cultivars, up to $25 for special cultivars. The Chafins can handle larger orders given sufficient lead time,

preparation for shipment and shipment.

Shipping costs (UPS, DHL) will have to be researched. They may be willing to travel to Nicaragua to assist/supervise in the appropriate handling and initial care of the introductions. Katie speaks Spanish. There are two ways of preparing the materials for shipment:

Airlayers removed directly from mother plant, trimmed, moistened, inspected, packed and sent DHL or UPS for potting in Nicaragua within 2 days at the latest. This method would need more delicate handling.

Airlayers potted in soil for 10 to 12 weeks of growth, bare-rooted, dipped in nutrient/pesticide solution, inspected, wrapped with moistening material, packed and shipped.

General observations and recommendations

The Chafins appear to be very capable of handling the introduction of various cultivars of lychee and longan plant materials, especially that they can handle the whole process, including shipping and even monitoring if requested.

Pine Island Nursery could also handle our needs, not only of lychee and longan but also the atemoyas and carambolas (star fruit).

Partial trial orders could be made of 10-20 of each cultivar, The full order to follow, depending on results of the initial order.

I would also recommend contacting possible suppliers in Hawaii - Kilohana Farm and Plant It Hawaii for quotations. They had supplied PROEXAG/EXITOS with plant materials previously.

Thursday, June 22 activities

Objectives/purpose:

To travel to Guatemala to get an update on the brambleberry and strawberry industry in the country and look into possible sources of planting materials for ARAP.

To get an update on the status of the tropical and subtropical exotic fruit introductions in Guatemala by PROEXAG/EXITOS Project and the possibility of these materials as source of planting materials for ARAP.

Contacts:

Margaret Luttmann, Guatemala Chemonics Office
Torre II Rm 301, 5a Av. 15-45
Guatemala City 01010 Tel: 502 367-2786/2788

Activities/observations:

Left the residence at 7:30 am in the Budget Car Rental vehicle for Miami International Airport. Returned the car, checked in and took off at 11:00 am, arriving in Guatemala City at about 11:40 am. Met by Margaret Luttmann at the airport with a rented car. Checked into the hotel at about 12:30 pm. Walked to the Chemonics office to contact people and prepare an itinerary for meetings and visits the next couple of days. Returned to the hotel at about 4:30 pm.

Friday, June 23 activities

Objectives/purpose:

To meet with some personnel of Asociacion Gremial de Exportadores de Productos No Tradicionales (AGEXPRONT, an organization much like APENN) for update on the status of brambleberries in Guatemala.

To meet with Pedro Echeverria, former PROEXAG employee and one of the largest producers of brambleberries in Guatemala for an update on the technologies in use in these crops and some leads in the sourcing of plant materials for ARAP.

Contacts:

Margaret Luttmann, Chemonics, Guatemala City

The following personnel of AGEXPRONT at 15 Ave. 14-72, Zona 13
Guatemala City, 01013. Tel: PBX 502 362-2002 Fax: 502 362-1950:

Fanny Estrada - Directora
Haroldo Zaldivar - Director Asistente
Irma Clavillo de Arias - Gerente Depto Capacitacion
Regina España - Coordinadora, Comite de Berries
Email: regina.espana@agexpront.or.gt

Pedro Echeverria, Finca San Sebastian
San Miguel Dueñas, Guatemala
Tel: 368-2578 Casa. Tel. Cell: 205-2905

Juan Mata, Agricultor
Finca en Piedra Parada, Izabal
Tel: 948-1354

Fernando Bolaños, COBSA
15 Calle 3-20, Zona 10

Guatemala City. Tel: 337-3911; 948-1352

Activities/observations:

Met with Margaret Luttman at Chemonics Office at 8:00 am to confirm appointments for the day and tomorrow and contact people by phone.

With Margaret, visited the offices of AGEXPRONT. Met initially with Fanny Estrada and she arranged for us to meet with the officers of her staff who deal with the berries and tropical fruits. At an informal meeting with Irma Clavillo and Regina España, they expressed interest in cooperating with APENN and ARAP in sourcing of plant materials and even exchange of technical information in the berries and tropical fruits. I happen to have with me a package each of dried mango strips, banana chips and glazed pili nuts. I had them sample these commercial products, made in the Philippines but available in the U.S. groceries. It happened that there was an exhibit and a meeting of the "Comite Deshidratadores de Productos" at that time and they also sampled the products as well, including the Director and Assistant Director of AGEXPRONT. They wanted more information on the products.
Returned to Chemonics office for more telephone contacts.

Juan Mata (a former student of mine at Univ. de San Carlos), in partnership with Fernando Bolaños, have now, probably the largest mangosteen plantation in Central America. Since 1993 when I last visited the plantation, there were some 8 large mangosteen trees (25 years old) and about 1,000 1-8 years old trees and since then he has been planting 200 seedlings every year. Juan and Fernando had at least two manzanas of rambutan in production the last time we visited their plantation a few years ago, with a good number of male trees not yet topworked. They received some of the the new EXITOS introduced cultivars. I was unable to get hold of Juan or Fernando but their farm would be a good source of planting materials for ARAP.

Pedro Echeverria picked me up at the hotel to visit Finca San Sebastian in San Miguel Dueñas, adjacent to Antigua. Pedro, who worked with me during the PROEXAG days, belongs to the family that owns one of the largest coffee farms in Guatemala. Pedro himself, after leaving PROEXAG, in partnership with Rodolfo Quesada, became one of the largest producer and exporter of blackberries and red raspberries in Central America, with IQF facilities for frozen berries. The Guatemalans did very well for a few years, exporting fresh and frozen to the US and Europe from about 400 manzanas of blackberries, 200 manzanas of red raspberries and 200 manzanas of strawberries. Then the Cyclospora scare hit the US market, followed later by Hurricane Mitch. They are now in the process of recovery, and Pedro is concentrating on the European market, after being burned by the Cyclospora scare.

Pedro showed me around the several berry plantations in the farm and provided some technological information on their management. Brazos is still the premier cultivar for Blackberries, Summit for the red raspberries and Sweet Charlie (first choice) and Camarosa for strawberries. Chandler is a poor third.

Pedro also received lychee and longan airlayers from EXITOS project. There were two lychee survivors and a longan survivor, all growing under partial shade. He was advised to reduce the shade and fertilize. Since the lychees have not flowered at all, he was advised to initiate floral induction by girdling come September or October this year.

Pedro is helping Fundacion Hondureña de Investigacion Agricola (FHIA) in developing the blackberry

and raspberry export potential in the areas of La Esperanza and Siguatepeque. He has provided not only the materials but also the expertise as a consultant in this project since it started about three years ago. The first trial (a learning process) export of blackberry was already made, the raspberries to follow soon. Pedro mentioned that he could be available for ARAP.

Returned to the hotel at 6:00 pm.

Saturday June 24 activities

Objectives/purpose

To meet with Javier Siliezar, my technical assistant during my EXITOS days, for an update on the status of the tropical and subtropical exotic fruits that were introduced by the project.

To have a look at Finca Porvenir in Barbarena, one of the larger blackberry plantation in Guatemala and get an update on cultivars and technologies in the production and export of the blackberries.

Contacts

Ing. Javier Siliezar, Gerente General
Distribudora Sidel, 2 Calle 2-60, Apto 8-A
Vista Hermosa, Guatemala City
Tel: 306-3885; Fax: 443-5381

Freddie Rivera, Coffee and Berry farmer
Finca Porvenir (IMPEX)
Barbarena, Guatemala.

Activities/observations

Met with Javier at the hotel at about 8:00 am. He worked with me in all the phases of the project's tropical and subtropical fruit plant material introductions and trial plantings in the six Central

American countries. When I left the project in 1993, he followed through with an additional batch of introductions from Florida and Hawaii. Carinter in Miami handled shipping. His report on the status of some of the plants in Guatemala include the following:

Most of the lychees and longans were lost except for a few survivors. The survivors have either not flowered or set fruit. He had given the same advise about girdling that I had given to the farmers on the surviving plants. He has not visited all the places where these introductions were planted.

The carambolas and rambutan introductions at Vivero Chiquimulilla of Cesar Juarez and that of Juan Mata in Izabal are doing well and being multiplied. Produce from these are already reaching the Guatemala City market.

The mangosteen produce from the Hererra farm at Cocales and from Juan's farm are also now reaching Guatemala City.

Javier also gave updates on the more recent cultivars of strawberries in use and technologies in the multiplication of strawberry planting materials, soil treatments with Basamid as alternative to methyl bromide.

Javier and I, in a rented vehicle, drove to Finca Porvenir Farm in Barbarena, at about 1,000 meters elevation. Freddie had as much as 26 manzanas of Brazos blackberries for export at the height of the berry boom (B.C.- Before Cyclospora) in Guatemala. He now has only 15 manzanas, exported mainly to Europe. He is starting to rehabilitate his blackberry plantations, gearing towards exportation during the winter months to the U.S. and Europe. He is using the pruning system recommended by PROEXAG and following closely the pesticide recommendations as well. His main concern is on the high prices of inputs (fertilizers and pesticides) and the volatile price trends of the berries. He would like to go into raspberries but his soils and climate are not suitable for this crop.

Looked also at his coffee nursery where he has hundreds of Bourbon types coffee grafted (Injerto Reyna method) on to Robusta stock.

Returned to the hotel at 4:00 pm

Sunday June 25 Activities

Objective/purpose:

To visit the Rancho Milano of Ernesto Rancati to look at the lychees he received from EXITOS and the blueberries he had introduced there.

Contact:

Ernesto Rancati, Proprietor
Rancho Milano, San Jose Pinula
(Milano Deli Y Reposteria)
Guatemala City. Tel: 360-7817 to 19

Activities:

Ernesto took me to his Rancho Milano at about 1,800 meters elevation, at San Jose Pinula. He has an arboretum and garden of ornamentals, fruit trees that included many kinds of citrus, pears, apricot, citrus, pecans, macadamia, granadilla and including lychees and longan. He has two survivors (about 7 years old) of the 6 he got from exitos, one of which is now in fruit (a few) for the first time. There are three other lychee trees he got from local sources, 2-3 years old at present. The only longan survivor somehow lost its top but new shoots are growing again. He was advised to put more soil at the base of the plants to cover exposed roots and not allow the water to collect there, with the area receiving a lot

of rainfall. Spent some time demonstrating how to prune trees, how to make airlayers and to girdle the lychees to induce flowering.

Ernesto brought in from Miami four years ago 18 "Southern" blueberries. Only 3 have survived so far and doing poorly. He had applied some sulfate fertilizer but may not be enough and the soil at the base is also depressed.

Monday June 26th, left Guatemala early for Managua.

Appendix 3. DAILY ACTIVITIES REPORT OF JOSE R. MONDOÑEDO ARAP NICARAGUA PROJECT JUNE 26-JULY 1/00

Monday June 26 Activities

Objectives/purpose:

To return to ARAP Nicaragua and follow through with assignments in the terms of reference on brambleberries and tropical fruits.

Contacts:

Ricardo Frohmader, Consultores Chemonics, Guatemala
James Johnson, ARAP
Michelle Rodriguez, ARAP
Alejandro Llanes, President, Nica Fruit
Carlos Morales, General Manager, Nica Fruit
Lance Leverenz, ARAP
Kevin Sanderson, Country Director, World Relief Nicaragua
Chester Lee Brinser, Program Asst, World Relief Nicaragua

Activities/observations:

Left the hotel in Guatemala for the flight to Managua. Met Ricardo Frohmader at the airport and discussed my findings on nurseries in Miami and the status of the EXITOS tropical fruit cultivars in Guatemala. Arrived in Managua at about 8:15 am, checked into the hotel and proceeded to ARAP Office. Met with Ricardo, Lance, James, and Michelle to plan the day's activities.

In the early afternoon with James, met with Alejandro Llanes and Carlos Morales, both of Nica Fruit, a private enterprise that bought into a processing plant and a nursery full of tropical fruit planting materials as follows:

10,000 Tommy Adkins mango grafts; 9,800 tamarind seedlings; 5,500 sapote grafts/seedlings; 2,500 guanabana graft/seedlings; some maracuya and banana planting materials.

Nica Fruit expects 1,000 tons of mango supply yearly from Mangosa for the processing plant. They would like to know about ARAP's tropical fruit project and how they can link with it in the production

and supply of raw materials for the plant. James explained our project, the areas and fruits we work with. They have to establish a working relation with the farmers as to growing the fruits they would like to promote, technical and financial assistance. I mentioned some of the problems that arise in these relationships, the long term wait before these crops come into production and the farmers' choice of turning in their produce to the processing plant or to a more lucrative outside market. Future dialogues needed.

Later in the afternoon, attended a meeting of ARAP (Ricardo, Ramiro, Lance and James) with World Relief (Kevin and Chester) to discuss their budgetary arrangements on their working relationship in the tropical fruit project of both organizations. Discussed the kind, genetic quality, sourcing, size and quantity of introduced planting materials, preparation for shipping, regulations for entry into Nicaragua. Discussed costs as related to quantity and budgetary limits, and how they would be handled through nursery centers (with ARAP technical and financial assistance) for the highlands crops and for the lowland crops and through improved government facilities as Campos Azules.

In the evening, prepared drafts of faxes and/or email to the various nurseries for information and quotations on their available planting materials, to be sent in the morning to: Going Bananas in Miami, Plant It Hawaii and Kilohana Farm in Hawaii and Mountain View Nursery in Queensland, Australia.

Other observations and comments:

In order to guarantee minimal losses in the introduction and multiplication of plant materials, the following steps in this end would have to be taken:

- For rapid handling of the shipment, all documents must be ready for fast exit from customs and quarantine.

- A mist room to place the newly planted materials in pots with good soil media to reduce chances for dehydration, before new roots and shoots can develop.

- A nursery with variable partial shade and irrigation (overhead or intermitent mist) for the plants to grow a few months until the leaves of the first or second vegetative flushes have matured, ready for field planting.

- A multiplication nursery where the introduced plants are initially planted in the field with the proper soil and climate needed by the crop cultivar, either in the region of final destination with irrigation or in an area provided with the required growing conditions. These trees will be the sources of branches for airlayers and budsticks for grafts for the commercial plantation.

These facilities could be the improved government nursery and/or the ones developed by ARAP with World Relief.

Tuesday June 27 Activities

Objectives/purpose:

To follow up on the sourcing of plant materials with phone calls and faxes.

To meet with the APRONOT, R.L. La Meseta. management at San, Marcos, Carazo.

Contacts:

Ricardo Frohmader of Chemonics Guatemala.
James Johnson, Lance Leverenz and Ramiro Irabien, all of ARAP.
Leny Telles and Sr. Mendieta of APRONOT.

Activities/observations:

In the office at 8:00 am, phoned Dale Krigsvold of FHIA, Honduras about Rambutan acreage in production in Honduras and Guatemala. He gave the figure of 400 manzanas in Honduras.

Had the Email sent to Going Bananas and faxes to the Hawaii nurseries about prices on their airlayers and grafts.

I was invited to meet with the APRONOT people at Carazo with James, Lance, Ramiro and

Ricardo. The APRONOT executives gave a briefing on the history and operation of the cooperative. Some notes follow.

- Asociacion de Productores de Productos No Tradicionales has about 160 members with small farm holdings. The plant was inherited from donor agencies such as the EEC (European Economic Community) and some others.

- Area at about 600 meters elevation, 1,400 mm annual precipitation and 6 months of dry season.

- The pulp processing and freezing plant can process fruits and vegetables. Last year, they processed 200 tons accounted as follows: 100 tons of pitahaya, 20 tons granadilla, 8 tons of piña and the rest in mango, carambola, maracuya, naranja, limon, others.

Products are packaged in different sizes of plastic bags for the local and export market. Ricardo mentioned other possible product preparations such as pitahaya bolls, frozen piña chunks and pulp.

Discussed other tropical fruits for the area. Looked at the facilities which are mostly in good condition and presently operating, doing some mango puree in small bags. Sampled a small commercial consumer size bag of a frozen pitahaya/banana mixture that was good.

After lunch, returned to the project office. Continued with the preparation of a strategy for the tropical fruit tree introductions. Returned to the hotel at 6:00 pm.

Wednesday June 28 Activities

Objectives/purpose:

To meet with James Johnson to set a program of activities for the day and the next few days.

To meet with Marcos Moreno, consultant of ARAP, for an update on the status of the EXITOS introductions in Panama.

Contacts:

James Johnson, ARAP.
Marcos Moreno, ARAP Consultant.

Activities/observations:

Talked to James early in the morning about visiting the other areas of operation of ARAP I have not yet seen, especially the area where the World Relief operates. A visit was set for Thursday June 29.

Met with Marcos Moreno who just arrived from Panama and got the following updates on the status of EXITOS introductions in Panama:

- Guillermo Henne's farm in Santa Marta at about 50 meters elevation, had plantings of EXITOS' plant materials - lychee, longan, rambutan, atemoya, carambola and durian. Except for the durian that were all lost, most of the others are growing and doing well especially rambutan and carambola. The lychee and longan plants, however, have not flowered. He has not done much propagation of the materials. Guillermo is willing to share his plant materials, as per agreement, with those interested.

- Price Peterson in Palmira/Boquete, at 1,100 meters altitude, has lychee and longan plants that are starting to produce. Surprisingly, the carambola at that elevation is also producing (probably in full sun). No feedback on atemoya.

- Richard Coyner's farm in David, is at about 600 meters elevation. He received planting materials of lychee, longan, atemoya, rambutan and carambola. Marcos has not had the chance to monitor these yet.

Marcos will try to monitor these when he gets back there, hopefully, with some evaluations on each cultivar's performance.

With no response from the faxes and email sent yesterday to the nurseries in Hawaii and Australia, another was sent this afternoon.

Continued with the preparation of the daily report. Returned to the hotel at about 7:00 pm

Thursday June 29 Activities

Objectives/purpose:

James Johnson wanted me to have a look at the operations of World Relief (W.R.)in Nueva Guinea.

Contacts:

Ing. Pablo Jiron, Field technician of ARAP.
Ing. Reinerio Rivera, Director Sureste, Programa Agricola, W.R.

Activities, observations:

With Pablo Jiron driving, we left Managua at about 6:00 am headed for Nueva Guinea, some 280 kilometers East of Managua. Arrived at Nueva Guinea at about 10:30 am and met with Reinerio in

his office where he gave us a briefing on the World Relief Project. Principal objective is to raise the standard of living of the settlers by providing them access to introduced planting materials of tropical fruits, spices and forest trees from a "Centro de Recursos" established by World Relief for this purpose. Technical and some financial assistance are also provided. Other information provided follows:

Nueva Guinea at about 220 meters elevation, 2,000 to 3,000 mm annual precipitation, relatively dry from February to April, clayey acid soils, pH at 4.5 to 5.5, poor to fair soil fertility, rolling topography.

There are some 2,620 Coop (head of family) members, 5 to 6 average number of individuals in each family.

World Relief has 18 field technicians to take care of the nursery, multiplication plots, provide training and extension service to the settlers.

A marketing center "Centro de Acopio" is being built.

The Centro de Recursos has 3 solar driers constructed at the cost of $400 each. There is also a Samoa type (wood fire/solar) drier. The settlers can acquire these driers with loans from W.R. The 1,080 square meters nursery with 50% Saran shade has propagating beds (with black pepper cuttings at the moment) and rows of nursery bank beds, pesently containing seedling materials of many kinds of

tropical fruit trees, spices and forest trees brought in from sources like Echo-Florida, Costa Rica, Honduras, Ecuador, etc. Designed to have overhead irrigation, there is already a well with pump for the irrigation system. They started building this nursery less than a year ago.

We went out to the field close by, the Sapote River running through the area, to look at the 120 manzana multiplication nursery and demonstration plantation, about 65 manzanas of which are already planted (in blocks) to 5 cultivars of cooking bananas (from FHIA) already in fruit, and different cultivars of citrus, rambutan, black pepper with three kinds of permanent of support, forest trees, others. Temporary partial shade are provided using Pigeon peas and other native vegetation, permanent partial shade with Erythrina, Inga and other native trees. Covercrops (Tephrosia, Crotalaria, Desmodium, Arachis, Canavalia, Mucuna) are used between rows to hold the soil and improve fertility. Rows of Vetiver serve as soil conservation measure.

Left Nueva Guinea after a late lunch and arrived in Managua after 7:00 pm.

Comments:

The project looks like they are going somewhere, with a competent and dynamic director running both Nueva Guinea and Rio San Juan W.R. Agricultural Projects. Given sufficient support, the propagation nursery could be completed with the overhead irrigation system, a mist spray propagation room included, cemented or gravel walkways with a drainage system. Otherwise, the

nursery will be eroded by the irrigation system.

In the multiplication nursery, the field roads, especially the main access road leave much room for improvement. There should be at least a portable irrigation in the multiplication nursery as insurance against unexpected dry spells that could severely affect the valuable germplasm.

Some plants are exhibiting minor element deficiency symptoms and general nutrition stress. Correction is recommended.

Friday June 30 Activities

Objectives/purpose:

Work at the ARAP office to continue adding information on sourcing of the tropical and subtropical exotic fruit tree planting materials.

To prepare a developmental strategy on the introduction, multiplication and desimination of the introduced exotic plant materials in the designated regions or areas.

Continue with the preparation of the daily reports and other information requested by ARAP.

Contacts:

Colleen Boggs of Pine Island Nurseries, Homestead, FL.

ARAP personnel.

ARAP personnel in the office.

Activities/observations:

Went to the ARAP office at about 7:30 am.

Contacted Pine Island Nurseries in Homestead by phone and got the information needed by ARAP on the number of plant materials in 3 and in 7 galon can containers, that a 40 ft van can hold and an estimate on the shipment cost to Managua. The sheet with the notes on this is attached.

Price quotations on the plant materials from Plant It Hawaii was received by fax. Copies of this and the notes above were furnished ARAP management. More faxes for quotations were sent to Queensland and Hawaii.

Worked in the office, following up the preparation of reports and information needed by ARAP management.

James Johnson programmed a visit for me to visit Vivero Paraiso to complete the monitoring of the EXITOS introductions and a visit to the fresh fruit markets in Managua.

Returned to the hotel at about 6:30 am.

Saturday July 1 Activities

Purpose/objectives:

Trip to the Wholesale Market Fruit and Vegetable Market of Managua to check on the presence of tropical and subtropical exotic fruits in the market.

To visit Vivero Paraiso of Roberto Sanchez to monitor the EXITOS cultivars in this nursery.

Contacts:

The merchants at the markets and the field man at the nursery.
Roberto Sanchez was not at the nursery.

Activities/observations:

ARAP driver Edwin picked me up at the hotel at about 7:15 am and took me to the Wohlesale Market of fruits and vegetables. There were the usual varieties of mangoes, bananas, pineapples, avocados, citrus, pitahaya, melons, papayas, Genip (mamoncillo), maracuya, granadilla, tamarind and nispero. The unusual fruits encountered were "nance", "icacao", "coyolito" and "guava" of minor significance in Nicaragua and the world market as well.

At Mercado Wembes fresh products market, we find the same fruits as in the wholesale market. There was one breadfruit, already ripe. We were told that "mamon chino" comes in this market during the season. We did find imported apples from Guatemala.

We were told also that these exotic fruits are found in the more sophisticated markets such as the Supermercado Colonia in Plaza España. There were no exotic fruits there but lot of imported apples, pears, peaches and plums.

We drove to Vivero Paraiso on the road to Masaya. Roberto Sanchez had just left, according to the field man. The field man did not know anything about unusual fruit trees. The vivero is in poor condition. While we waited for Roberto, I looked around and found the two introduced carambolas I had seen and tasted some four years ago. They have grown some but should have been bigger at 8

years old. Found three other large carambola trees, two of which are local very sour types. The other, fortunately, had a lone ripe but deformed fruit which tasted very sweet. Looked around some more and found an Anonacea that looked like an atemoya but I could not verify without fruits. We left after waiting a full hour and returned to the hotel at about 11:30 am.

Spent the rest of the afternoon working on the report.

The next day is Sunday, July 2nd.

Appendix 4. DAILY ACTIVITIES REPORT OF JOSE R. MONDOÑEDO ARAP NICARAGUA PROJECT JULY 3-12, 2000

Monday July 3 Activities

Objectives/purpose:

At the office to continue looking for sources of planting materials for ARAP's tropical and subtropical exotic fruits and brambleberry projects.

To continue preparing reports of consultant's activities.

Contacts:

ARAP office personnel.

Activities/observations:

Discussed with Lance Leverenz and James Johnson crop priorities in ARAP's tropical, subtropical fruit and brambleberry development project. Priorities on the tropical and subtropical fruits were placed tentatively as follows: top priority category to rambutan, lychee and mangosteen. longan, mango and durian followed, and then others (carambola, atemoya, others) in the last category.

Sent faxes and telephoned nurseries in Florida, Hawaii and Australia for possible suppliers of the exotic fruits. Finally got a response from Plant It Hawaii, with 800 grafts representing six cultivars of rambutan, available for ARAP Nicaragua. Got also a reply from Pine Island Nursery in Homestead that they can supply most of the needs of ARAP on lychee, longan and atemoya.

Met with James to prepare a program of visits to the areas of operation of PAC/WR where most of the planting materials will be destined.

Continued with the preparation of the report the rest of the day.

Tuesday, Independence Day, July 4th

Objectives/purpose/ contacts/ activities

Met with James Johnson at the office of ARAP to finalize the plan for the visit to the PAC/WR areas of operation within the Mitch zone of influence. Talked to James also about the projected seminar presentation I am supposed to give on the tropical and subtropical fruits and brambleberries at the end of my consultancy period.

For the rest of the day, continued with the preparation of reports and for the seminar scheduled for

Tuesday July 11th in Esteli.

Wednesday, July 5 & 6 activities

Objectives/purpose:

Trip to Madriz, Nueva Segovia and Jinotega to visit the areas of operations of PAC/WR/ARAP for a better understanding of their working relations with ARAP as regards the tropical and subtropical exotic fruits and the brambleberry project.

Contacts:

Chester Brinser III, Program Assistant, World Relief
Miguel Angel Rodriguez, ARAP Agricultural Specialist, Esteli
Rafael Flores, Training Officer, Ocotal, World Relief
Julio Mendez, Ocotal Office, World Relief
Hector Alvarado, Temperate Fruit Crop Consultant, Guatemala

Nestor Rodriguez, In Charge, Quilali Office, World Relief
Pedro Gutierrez, Agricultural Program Director, World Relief

Activities/ observations/comments:

With ARAP driver Edwin and Chester Brinser, took off very early Madriz. On the way, picked up Miguel Angel in Esteli. Arrived at Palacaguina, about 200 km North of Managua. Met with Rafael Flores and Julio Mendez to look at the site where a satellite nursery distribution center will be established. The 5.5 manzana fairly level area has already a water well with a pump for irrigation, water table at 8-10 meters. The farm is at 450 meters elevation, 700 mm of average annual precipitation, dry season from November to April, clay loam soil with pH 6-7. It is a lowland dry area, good for mango, cashew and pitahaya. The nursery would have to be well equipped with irrigation facilities and partial shade. Field plantings would have to be irrigated during the long dry season.

From Palacaguina, drove the backway through cattle farms on up to Sabanah, 240 km from Managua. Here is where the Highland Primary Resource Center is to be located. At about 1,600 meters elevation, the area is cool, with about 2,300 mm annual precipitation, a short dry season of 2-3 months, deep clay loam soils, pH tentatively furnished at just below 6. There are 23 manzanas in this World Relief land, 2.5 manzanas already planted to several low chill temperate fruit crops, with technical assistance from Hector Alvarado. In April this year, a shipment from a Tennessee Nursery was received (Via DHL), containing hundreds of grafts of apples, pears and apricots, and seedlings of persimmon, walnuts and pecans. They came bare-rooted but dipped in moisture gel, wrapped special paper and packaged. The plants look good in the field. Hector promised to give us an inventory of the plants received. He mentioned four cultivars of peaches, the pear as an Asian Pear cultivar. The apple cultivar is Anna, with Golden Dorsett for the pollen source. He is trying out three pruning systems for apples - "copa, lider central y espaldera". Hector says that the nursery

problem here would be how to keep the environment warm, like a greenhouse. Propagating beds, beds for potted seedlings and grafts will be provided with the necessary mist and irrigation facilities, a multiplication nursery and demonstration field plots as well. Climatological information is lacking in the area, although a rain gauge was just put in. It is essential that they have a basic weather station in the area, minimum/maximum temperature thermometers at least. I explained to Chester about grafts and airlayers and advised the technicians to always remove any growth of shoots coming out of the rootstocks, otherwise the graft will be lost.

Hector is from Quetzaltenango and knows my good friend Oscar Ovalle, one of the largest producer and exporter of apples (and peach and pears) in Guatemala. I worked with Oscar in establishing his blackberry plantation. Hector is also bringing in Brazos blackberry and Summit red raspberry for trials in Sabanah.

From the Sabanah Farm, drove to Quilali, 270 km from Managua where we met with Nestor Rodriguez. At 350 meters elevation and 1,500 to 2,000 mm annual precipitation, it is a midway tropical humid climate with 3-5 months of dry period. Nursery beds are provided with irrigation emitters. A lot of plants from Nueva Guinea were brought here - rambutan, coffee, citrus, macadamia, canela, black

pepper, Alspice, cacao, 5 plantain cultivars, cacao, pineapple, others. There are two good sized buildings - one used as bodega for now and training center, the other as bodega also but will be a "centro de acopio" or for receiving and handling produce. They are equipped with big trucks, a tractor and several vehicles. Hollow blocks and other pre-fab pieces for relief housing are made here. There

are 12 hectares in this complex, two are for the nursery facilities provided with irrigation.

At supper, met with Pedro Gutierrez and his assistant to plan the next day's activities. Two areas, Plan de Grama and San Jose de Bocay in Jinotega cannot be reached for now from this side of Rio Loco because of the river and road conditions. Pedro promised to give us data on the soil and climatic conditions in these two areas.

Finally retired for the night at about 10:00 pm.

Thursday June 6 activities

Objectives/purpose:

To visit Wiwili where the second primary Resource Center will be located.

Contacts:

Charles Brinser III, Program Assistant, World Relief
Miguel Angel Rodriguez, ARAP Technician
Pedro Gutierrez, Region Director, World Relief
Alcides Moncada-Casco, Chief of Wiwili Agricultural Operations
Gilberto Ortiz, Agricultural Technician

Activities/observations:

With Miguel Angel, Chester and Pedro, took off early for Wiwili
driving alongside Rio Loco River for some ways. Arrived at Wiwili, some 290 km from Managua. Rio Loco separate Wiwili in two, the Jinotega side and the Nueva Segovia side, linked only for now by dugout passenger service or a very high clearance vehicle when the river is low. Facilities of World Relief are also divided, with nurseries on both sides although the Segovia side will have the Resource Center. World relief has a two story large bodega in town that will serve later as office, training center and "centro de acopio". Segovia nursery resource center, multiplication plots and demonstration plots are only a kilometer from town, along the Rio Loco River. There are 33 manzanas, at about 350 meters elevation, with about 1,000 mm of annual precipitation, deep alluvial (franco-limoso) soil, a large part fairly level with slopes rising over a small hill and down again away from the river banks. A natural spring flow all year round from the hill. Water can be pumped from the river when needed. A good area for mangosteen, rambutan, atemoyas, carambolas, others

Pedro says that Plan de Grama at over 1,000 meters elevation, cool but not as cool as Sabanah, with more rainfall precipitation, at about 1,600 mm. San Jose de Bocay is at about 350 meters elevation but

definitely more humid and more precipitation (at about 1,900 mm) than Wiwili. He promised more accurate information on the soil and climate of these two areas.

Took off from Wiwili at about 11:00 am and arrived in Managua at about 6:00 pm.

Friday July 7 activities

Objective/purpose:

To work at the office to continue preparing the daily trip reports and preparations for the seminar and the final report.

Contacts:

James Johnson and other ARAP personnel.

Activities:

Walked to ARAP's office at about 7:30 am. Talked to James about the seminar presentation which will be held in Esteli in the morning. Most of ARAP/WR's clients are close to Esteli.

For the rest of the day, continued working on the reports and preparation for the seminar. Returned to the hotel at 6:00 pm.

Saturday July 8 activities

Since ARAP's offices are closed on Saturdays, stayed at the hotel working on the reports.

Took off for a while to look at the fresh fruit markets in Managua and found nothing unusual except for a few mangoes the vendor identified as "mango chino". They are the fiber free yellow Asian mango alright with the characteristic flavor but with huge fat seeds.

Looked at the reference materials and color slides I brought and prepared an outline of my seminar presentation. Took notes on the topics to be presented.

Monday July 10 activities

Objectives/purpose:

To the ARAP Office to continue preparing the appendices that will accompany the final report and prepare some materials for the Seminar.

Trip to Esteli in preparation for the seminar the following day.

Contacts:

James Johnson and Miguel Angel Rodriguez, both of ARAP.

Activities:

Prepared to check out at noon from the hotel for the trip to Esteli. Walked to ARAP offices at about 7:30 am and started preparing copies of the appendices that will accompany the final report. Prepared copies of the seminar outline of topics to be presented and discussed, as well as copies of other handout materials for the seminar.

At noon time, returned to the hotel. Checked out and with Miguel Angel, drove to Esteli, about 147 km from Managua. Checked in at the hotel and prepared for the seminar, scheduled for 9:00 am the next day.

Tuesday July 11 activities

Objectives, purpose:

Presentation of the seminar on tropical and subtropical fruits to a heterogeneous group of people from the region to highlight ARAP's agricultural development program in helping the people in the areas that suffered from Hurricane Mitch.

Contacts:

Ramiro Irabien, James Johnson, Miguel Angel Rodriguez, all of ARAP.
A total of about 65 guests attended the seminar composed of a heterogenous from the Esteli and Auxilio Mundial.

Activities/ observations:

At about 9:30 am, Ramiro Irabien opened the seminar with a brief exposition of ARAP's objectives and activities and presentation of the seminar speaker. A handout (copy attached as Appendix 6) was prepared and given each participant. A colorslide presentation was used in developing the topics as listed in the handout. Questions were entertained all through the presentation, indicating a lot of interest on the tropical and subtropical exotic fruit crops and the brambleberries

After the seminar, ARAP hosted a luncheon for the participants. At about 2:30 pm, drove back to Managua with James and Ramiro. At the hotel, completed the daily report and the final report in a

diskette for printing and submission to ARAP Nicaragua authorities the following day.

Wednesday July 12 activities

Submission of final report and return to Annapolis, Maryland

Appendix 5a. Lychee sources of plant materials for ARAP

A. Local sources: None as far as we know.

B. Central America:

CORBANA, Costa Rica EXITOS Cultivars * Need to contact.

EARTH, Costa Rica Plants from CORBANA Contact Dr. P. Tabora

FHIA, Honduras EXITOS Cultivars * Need to contact.

RITTENHOUSE, Honduras Brewster Need to contact.

PROGRESSO, Honduras Brewster Need to contact.

GREXPAN, Panama EXITOS cultivars * Contact M. Moreno

C. Homestead Florida nurseries:

GOING BANANAS Mauritius, Brewster, $15 each airlayer
Hak Yip; Special ones Up to $25 each

PINE ISLAND Mauritius, Brewster, $8-10 each, depends
Several others on cultivars

PARADISE PALM Mauritius, Brewster, $10-12 each,depends
$35 in 7 gal can

GREEN-LAND TROP Mauritius only $10-12 each

LARA FARM Mauritius, Brewster $7-10 each,

D. Hawaii nurseries:

PLANT IT HAWAII Kaimana, Bosworth-3, $17.50 in 2 gal pot
Salathiel, Groff, Ditto
Kwai Mi Ditto

KILOHANA (Same as Plant It, no quotations yet)

E. Australia Nursery:

MOUNTAIN VIEW Kaimana, Kwai Mi, No quotations yet
Salathiel, Wai Chi Ditto

FITZROY (No response so far)

* Kaimana, Kwai Mi Pink, Kwai Mi Red, Salathiel, Wai Chi

jm file: nicaarap.lyc
Appendix 5b. Longan sources of planting materials for ARAP

A. Local sources:

SELVA NEGRA Kohala Two trees

B. Central America:

CORBANA, Costa Rica EXITOS Cultivars * Need to contact.

EARTH, Costa Rica Plants from CORBANA Contact Dr. P. Tabora

FHIA, Honduras EXITOS Cultivars * Need to contact.

GREXPAN, Panama EXITOS Cultivars * Contact M. Moreno

C. Homestead Florida nurseries:

GOING BANANAS Kohala, Beaw Keaw, $15 each airlayer
Dagelman, Tiger Eye, Up to $25 special
IFAS 1-3 cultivars

PINE ISLAND Kohala, Dagelman, $8-18 each airlayer Sri Chompoo

PARADISE PALM Kohala $10-12 each airlayer

$35 in 7 gal can

GREEN-LAND TROP Kohala $10-12 each

LARA FARM Kohala, Pon Yai $7-10 each

D. Hawaii nurseries:

PLANT IT HAWAII Biew Kiew $20 in 2 gal pot
Sri Chompoo Ditto

KILOHANA (Same as Plant It, no quotations yet)

E. Australia Nursery:

MOUNTAIN VIEW Kohala, Biew Kiew, (No quotations yet)
Haew

FITZROY (No response so far)

* Kohala, Biew Kiew, Haew

jm file: nicaarap.lgn

Appendix 5d. Durian, atemoya and carambola sources of planting materials for ARAP.

Durian Sources

A. Local sources: (None as far as we know.)

B. Central America:

FHIA/LANCETILLA, Honduras. (Need to contact.)

C. Hawaii nurseries:

PLANT IT HAWAII (Unable to supply this year. Considers it very difficult to ship.)
KILOHANA FARM (No reponse so far)

D. Australian Nurseries:

MOUNTAIN VIEW Mon Thong, D-98, (No response so far)
D-98, Gob Yeow

FITZROY (No response so far)

Atemoya Sources

A. Local sources:

VIVERO ALEJANDRIA 3 large plants of EXITOS cultivar *

B. Central American sources:

CORBANA, Costa Rica EXITOS cultivars * (Need to contact)

FHIA, Honduras EXITOS cultivars * (Need to contact)

IICA/MAGA, Guatemala EXITOS cultivars * (Need to contact)
CHIQUIMULILLA, Guate Ditto Ditto

G. HENNE, Panama EXITOS cultivars * (Need to contact)

BABCO, Belize Exitos cultivars * (Need to contact)

* Geffner, African Pride, Pink Mammoth, Hillary White

C. Hawaii sources:

PLANT IT HAWAII African Pride,Geffner (No price quoted)
Pinks Mammoth

KILOHANA FARM Same as Plant It. (No response)

D. Australian sources:

MOUNTAIN VIEW Hillary White (No response)

FITZROY (No response so far)

Carambola Sources

A. Local sources:

VIVERO ALEJANDRIA EXITOS cultivars * 18 large plants

VIVERO PARAISO EXITOS cultivars * 3 small plamts

B. Central American sources:

IICA/MAGA, Guatemala EXITOS cultivars * (Need to contact)
CHIQUIMULILLA, Guate EXITOS cultivars * (Need to contact)

FHIA, HOnduras EXITOS cultivars * (Need to contact)

G. HENNE, Panama EXITOS cultivars * (Need to contact)

BABCO, Belize EXITOS cultivars * (Need to contact)

* Arkin, Kari, Kyra

C. Hawaii sources:

PLANT IT HAWAII Arkin, Kari, Kyra (No prices quoted)

KILOHANA FARM (No response so far)

D. Australian sources:

MOUNTAIN VIEW Fuang Tung, Giant Siam (No response yet)
Sri Kembangan

FITZROY (No response so far)

Appendix 5e. Berry sources of planting materials for ARAP.

Blackberry Sources

A. Local:

Yv CASTELLON, Jinotega Brazos ?? (Need to contact)
Ju SOLORZANO, Matagalpa Brazos ?? (Need to contact)

B. Central America:

P ECHEVERRIA, Guatemala Brazos Tel: 502 368-2578

AGEXPRONT, Guatemala Brazos Tel: 502 362-1950
CINDE, Costa Rica Brazos (Need to contact)
FHIA, Honduras Brazos (Need to contact)

C. U.S.A.:

BOB WELLS, Texas Brazos, others Tel: 903 882-3500
LARRY WOMACK, Texas Brazos, others Tel: 817 893-6497

Raspberry Sources

A. Local: None

B. Central America:

P ECHEVERRIA, Guatemala Summit Tel: 502 368-2578
AGEXPRONT, Guatemala Summit Tel: 502 362-1950

C. U.S.A. Nurseries:

NORTH STAR GARDENS, Minn. Summit, others Tel: 612 433-2832
NOURSE NURSERY, MA. Summit, others Tel: 413 665-7888

Strawberry Sources

A. Local:

Yv CASTELLON, Jinotega Chandler (Need to contact)

B. Central America:

P ECHEVERRIA, Guatemala Sweet Charlie, Camarosa, Chandler Tel: 502 368-2578

C. U.S.A.:

North Star Gardens & Nourse Nursery, Telephone above.
Try Castellon's source in California. Need to contact her.